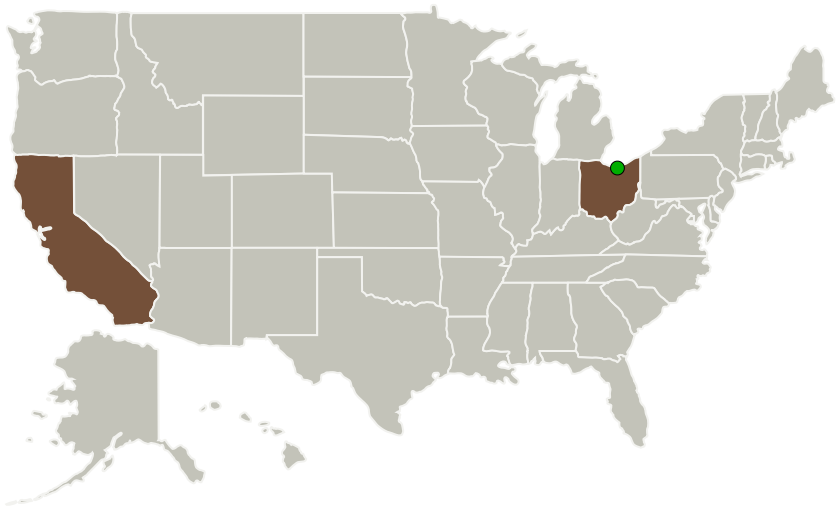
# Interferometric Star Tracker for High Precision Pointing, Phase I

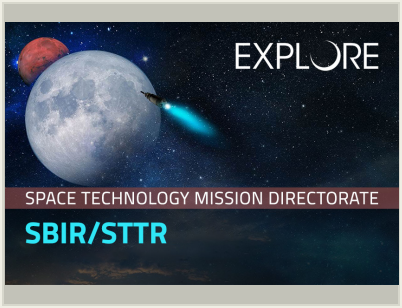
Completed Technology Project (2014 - 2014)

## Project Introduction

Optical Physics Company (OPC) proposes to adapt the precision star tracker it is currently developing under several DoD contracts for deep space lasercom beam pointing applications. The advantages of using an interferometric star tracker for beam pointing are numerous, these include the following: 1. Celestial reference based beam pointing eliminates need for having a ground based beacon for return beam pointing. 2. Precision star tracker can be part of the spacecraft attitude control subsystem, thus allowing a single high performance instrument to support both attitude control and lasercom beam pointing functions. 3. By allowing the lasercom system to point with a faint beacon and/or weak stars, the same lasercom system architecture can be employed for both deep space flight terminal and the near-Earth terminals operational from near orbit to very deep space mission. The Phase I effort will be a firm foundation for Phase II: We will not only have developed the concept and the design of the Precision Pointing Platform but also validated the functionality and performance using detailed simulation that includes models of the active isolators and the jitter environment with high fidelity. The simulation will use a realistic star background. Furthermore, Phase I work will also produce a pointing error budget that takes into consideration effects of SNR, unrejected platform jitter, alignment errors and optical fabrication errors.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Optical Physics Company | Lead Organization | Industry | Calabasas, California |
| Glenn Research Center(GRC) | Supporting Organization | NASA Center | Cleveland, Ohio |

| Primary U.S. Work Locations | |
|---|---|
| California | Ohio |

## Project Transitions

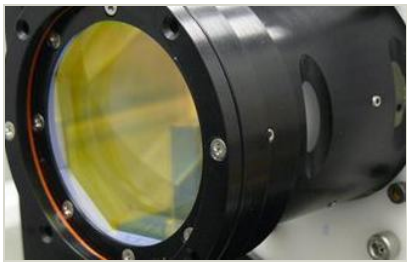
**June 2014:** Project Start

**December 2014:** Closed out

**Closeout Documentation:**

- Final Summary Chart*(https://techport.nasa.gov/file/140739)*

## Images



**Briefing Chart**
Interferometric Star Tracker for High Precision Pointing, Phase I *(https://techport.nasa.gov/image/134864)*

## Organizational Responsibility

**Responsible Mission Directorate:**
Space Technology Mission Directorate (STMD)

**Lead Organization:**
Optical Physics Company

**Responsible Program:**
Small Business Innovation Research/Small Business Tech Transfer

## Project Management

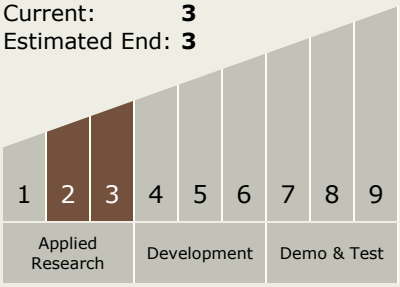
**Program Director:**
Jason L Kessler

**Program Manager:**
Carlos Torrez

**Principal Investigator:**
Chien C Chen

## Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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## Technology Areas

**Primary:**

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.1 Optical Communications
    - TX05.1.4 Pointing, Acquisition and Tracking (PAT)

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System